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# SERVIR Weather and Climate Services: A 100% Chance of Capacity Building

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# Countries Around the World Need Weather and Climate Data



## PROBLEM

- Complex challenges occur in data-scarce environments
- Many countries lack the capacity to use satellite data and geospatial technologies to manage resources and risk

## APPROACH

- Build regional capacity at a global scale in the spirit of self-reliance
- Ensure needs-driven and collaborative solutions for impact, buy-in, and sustainability
- Leverage U.S. leadership in science and technology



Agriculture &  
Food Security



Water & Water-  
Related Disasters



Land Cover, Land Use  
Change & Ecosystems



Weather &  
Climate

# CONNECTING SPACE TO VILLAGE



SERVIR is a partnership of NASA, USAID, and leading geospatial organizations in Asia, Africa, and Latin America.

- We work with countries and organizations in the use of free and open satellite data to build resilience to climate change and address its contributing causes.
- We co-develop innovative solutions through a network of regional hubs to improve sustainable resource management at local, national and regional scales.
- We build capacity to address critical challenges in climate change, food security, water and related disasters, land use, and air quality.



RCMRD ICIMOD



ALLIANCE

# SERVIR Focuses on Countries in Asia, Africa, & the Americas



Science Coordination Office  
NASA / MSFC

USAID Washington  
NASA Headquarters

SERVIR Amazonia  
CIAT

SERVIR West Africa  
CILSS / AGRHYMET

SERVIR Eastern &  
Southern Africa  
RCMRD

SERVIR Himalaya  
ICIMOD

SERVIR Mekong  
ADPC



FOCUS COUNTRIES



ADDITIONAL REACH



# Who Is SERVIR?



- Poverty reduction & resilience
  - Data-dependent issues in data-scarce places
  - International field presence
- 
- 30+ Earth observing satellite missions, free & open data
  - Major research portfolio
  - Societal benefit from space



## Regional Hub Host Institutions:



## Hub Consortium Members:



## Private sector collaborators:



## USG collaborators:



## Intergovernmental, NGO collaborators:



**Research collaborators:** 20+ US universities & research centers through the SERVIR Applied Sciences Team; ITC, in-region university networks

## SERVIR Planning Tools:



Consultation  
& Needs Assessment



Stakeholder Mapping

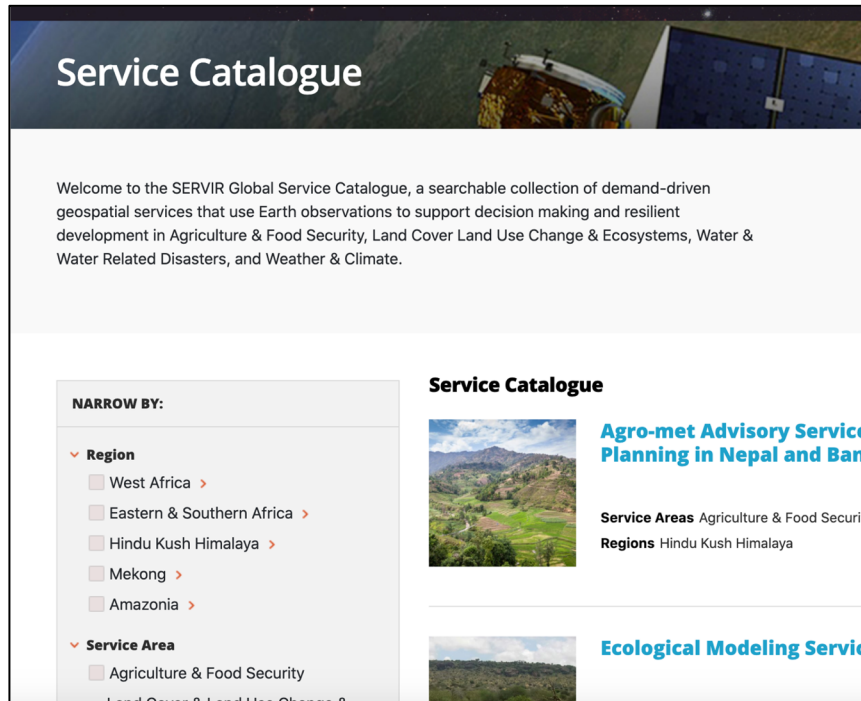


Service Design



Monitoring, Evaluation  
& Learning

[Service Planning Toolkit Link](#)



The screenshot shows the 'Service Catalogue' page of the SERVIR Global Service Catalogue. The header features a satellite image of Earth with the title 'Service Catalogue'. Below the header, a welcome message states: 'Welcome to the SERVIR Global Service Catalogue, a searchable collection of demand-driven geospatial services that use Earth observations to support decision making and resilient development in Agriculture & Food Security, Land Cover Land Use Change & Ecosystems, Water & Water Related Disasters, and Weather & Climate.' The main content area is divided into two sections. On the left, under the heading 'NARROW BY:', there are two expandable filters. The 'Region' filter is expanded, showing a list of regions: West Africa, Eastern & Southern Africa, Hindu Kush Himalaya, Mekong, and Amazonia. The 'Service Area' filter is also expanded, showing 'Agriculture & Food Security' and 'Land Cover & Land Use Change & Ecosystems'. On the right, under the heading 'Service Catalogue', there are two service cards. The first card is titled 'Agro-met Advisory Service Planning in Nepal and Bangladesh' and features a landscape image. Below the title, it lists 'Service Areas' as 'Agriculture & Food Security' and 'Regions' as 'Hindu Kush Himalaya'. The second card is titled 'Ecological Modeling Service' and features a landscape image.

[Service Catalogue Link](#)

# SERVIR Service Examples: Data in Action



Regional Hydrologic  
Extremes Assessment  
System (RHEAS)



South Asia Land Data  
Assimilation System  
(SALDAS)



Ephemeral Water  
Body Mapping



High-Impact Weather  
Assessment Tool  
(HIWAT)

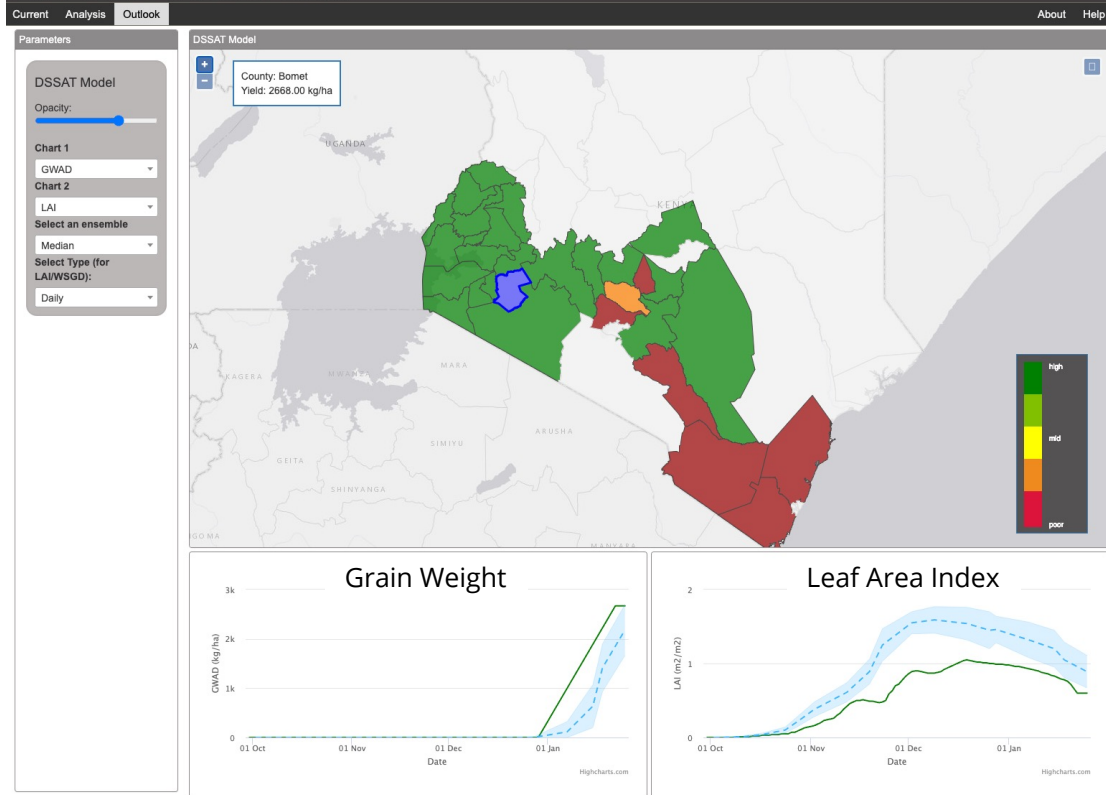
***Cross-Cutting: Data Access with ClimateSERV***

# The Regional Hydrologic Extremes and Assessment System (RHEAS)



- Framework for providing nowcast and forecasts of hydrologic and agricultural forecasts - e.g., streamflow and crop yields
- Deployed this system in multiple regions including Eastern Africa and Southeast Asia

## RHEAS Viewer Beta





# The Regional Hydrologic Extremes and Assessment System (RHEAS)



- What users need is not always what is directly available from weather and climate models
- Advanced planning often requires the use of application models such as DSSAT or hydrologic models forced by hydrometeorological information

## RHEAS Viewer Beta

Current Analysis Outlook

About Help

DSSAT

Chart 1

GWAD

Chart 2

LAI

Select an ensemble

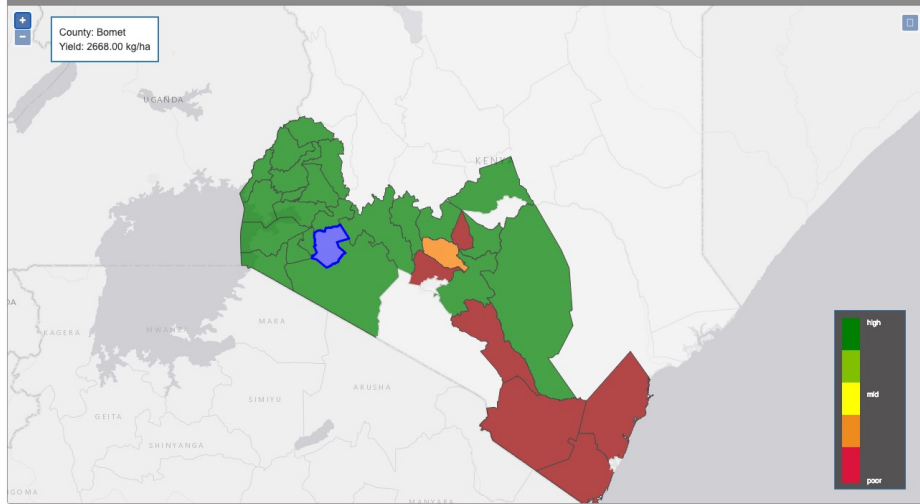
Median

Select Type (for LAI/WSGD):

Daily

DSSAT Model

County: Bomet  
Yield: 2668.00 kg/ha



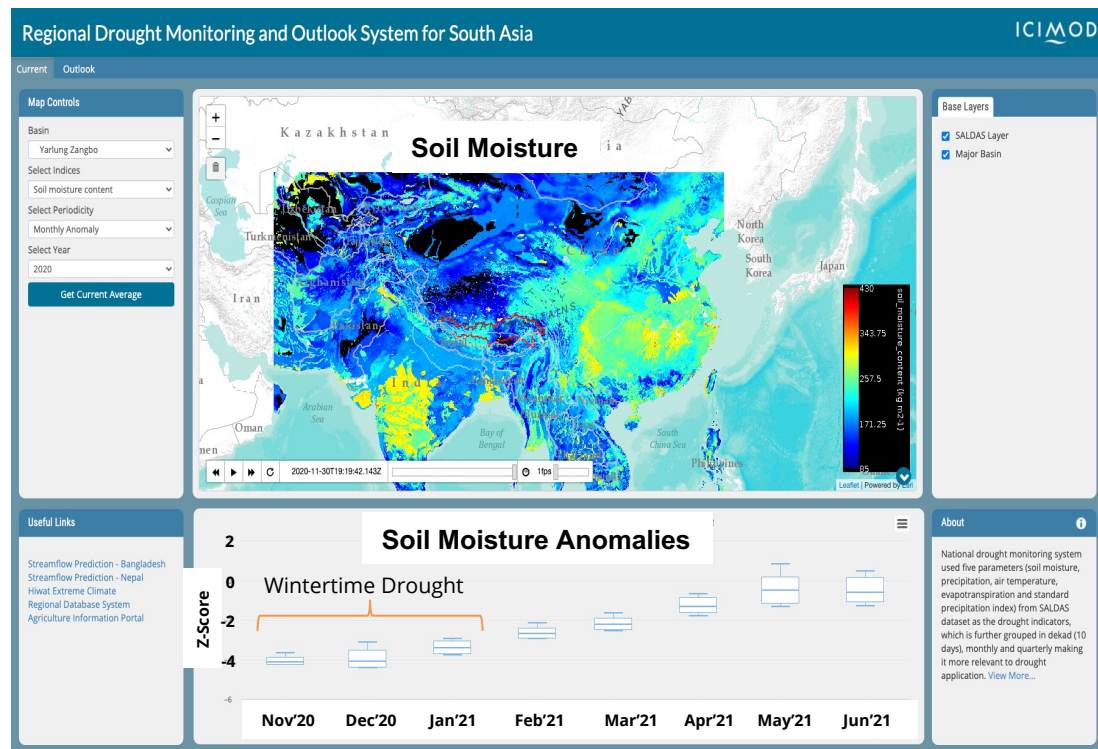
Grain Weight



Leaf Area Index

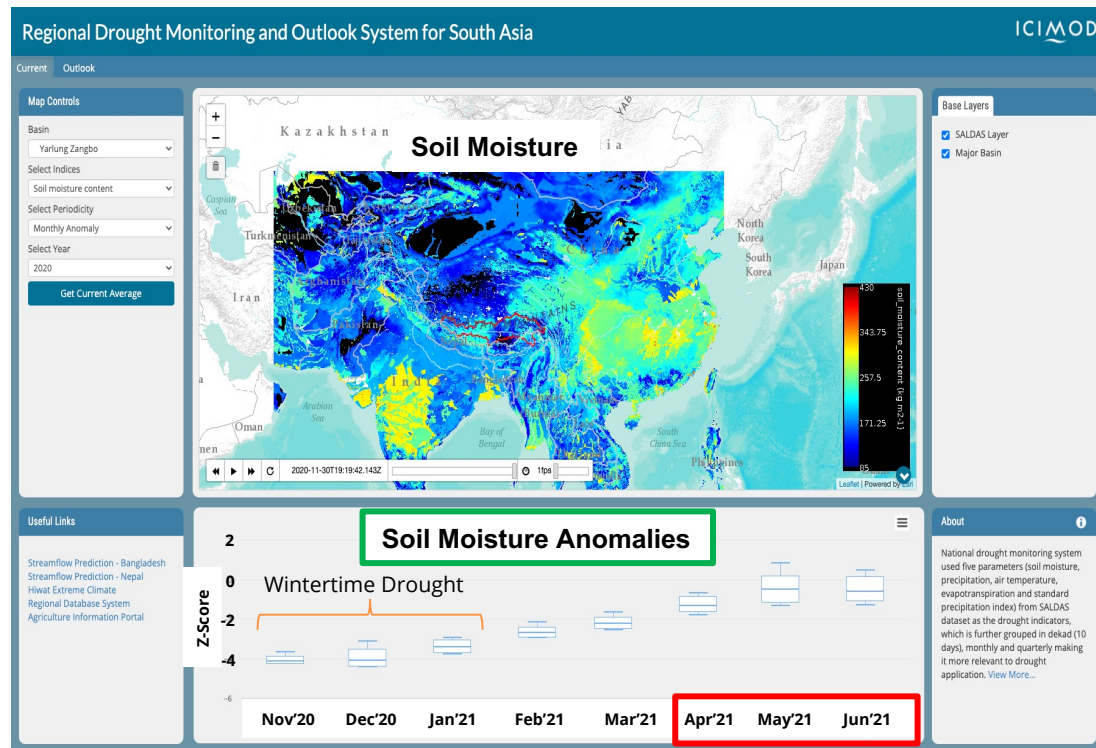


- An integrated land data assimilation system providing real-time monitoring and outlooks based on seasonal forecasting
- Tailored system for South and Southeast Asia and currently deployed by ICIMOD



Courtesy of ICIMOD: <http://tethys.icimod.org/apps/regionaldrought/>

- Long-term outlooks require subseasonal to seasonal forecasting systems
- SALDAS is powered by forecasts from the NASA Goddard Earth Observing System S2S prediction system (GEOS-S2S)
- Users need forecasts placed into historical context. Long-term observational records or hindcasts are used to evaluate climate anomalies.

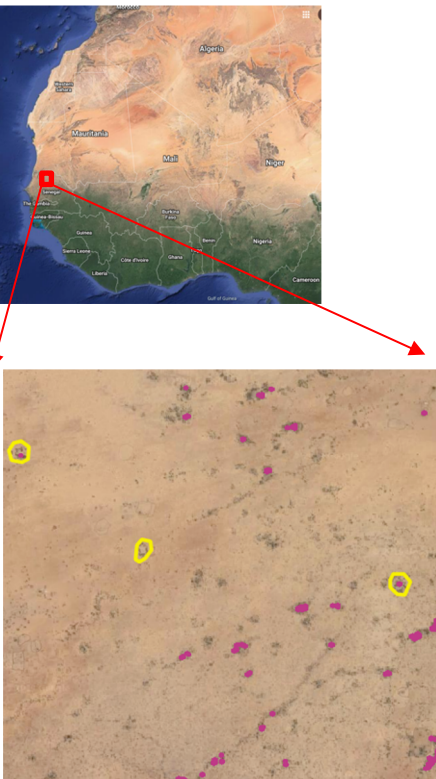
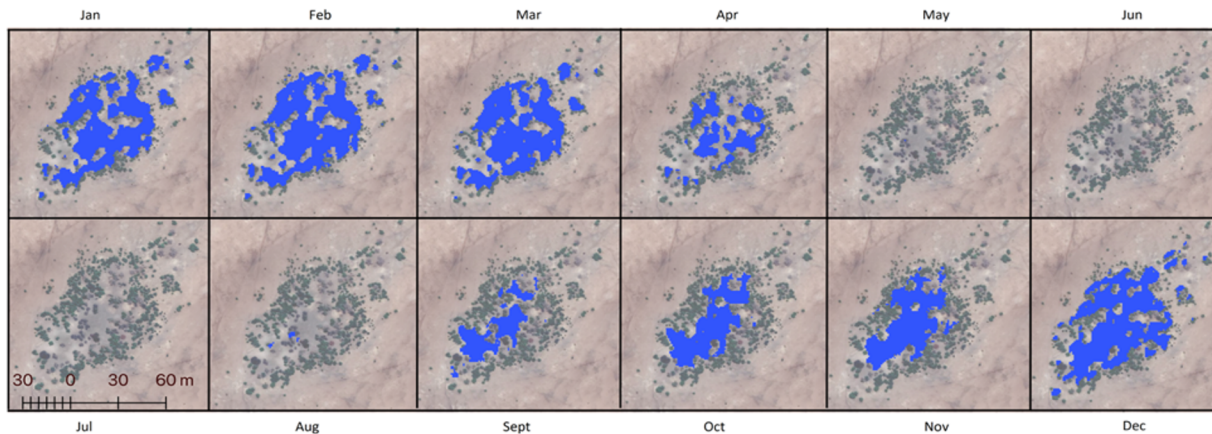


Courtesy of ICIMOD: <http://tethys.icimod.org/apps/regionaldrought/>

# Ephemeral Water Body Monitoring in West Africa

Pastoralists in parched West African rangelands rely on small ponds for their livestock. SERVIR has developed a tool to monitor and map where water is available.

- These small water bodies hold water for part of the year, providing for the region's nearly 60,000 herders
- Monthly composites provide actionable information to direct herds during the dry season (Oct-June)
- Information is relayed by a web-based platform and community radio broadcasts in remote areas



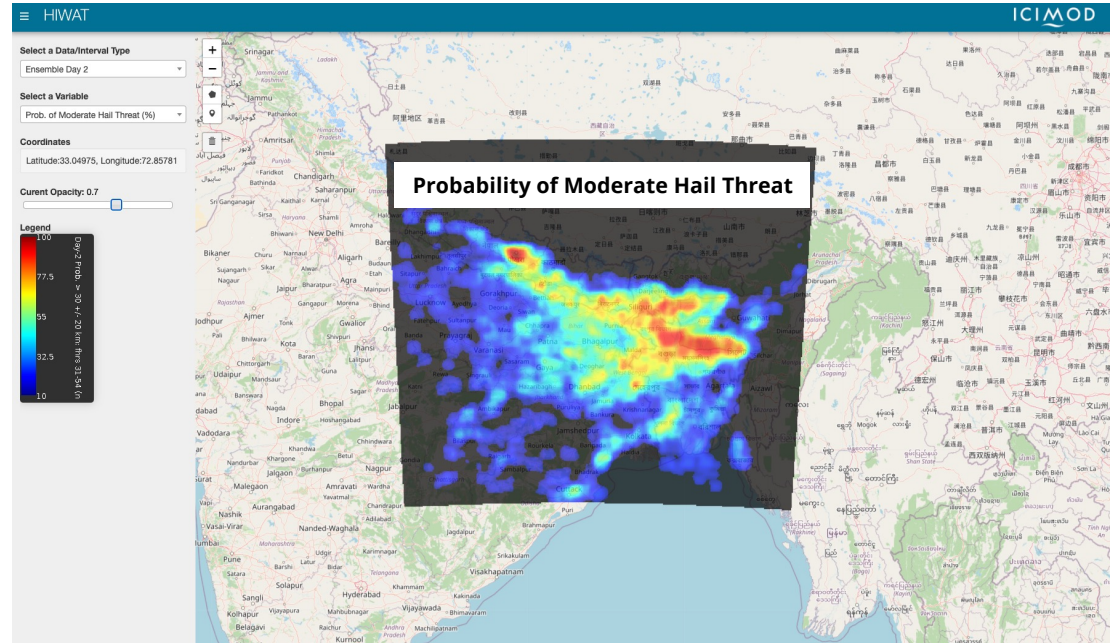
*Ephemeral water bodies detected using high resolution Planet data time series. Known ephemeral ponds are outlined in yellow.*



# Improving Storm Forecasting Across South Asia

The **High Impact Weather Assessment Tool** (HIWAT) is used by officials in Bangladesh and Nepal for high-accuracy forecasts and warnings ahead of floods, hail, lightning, and other hazards across south Asia.

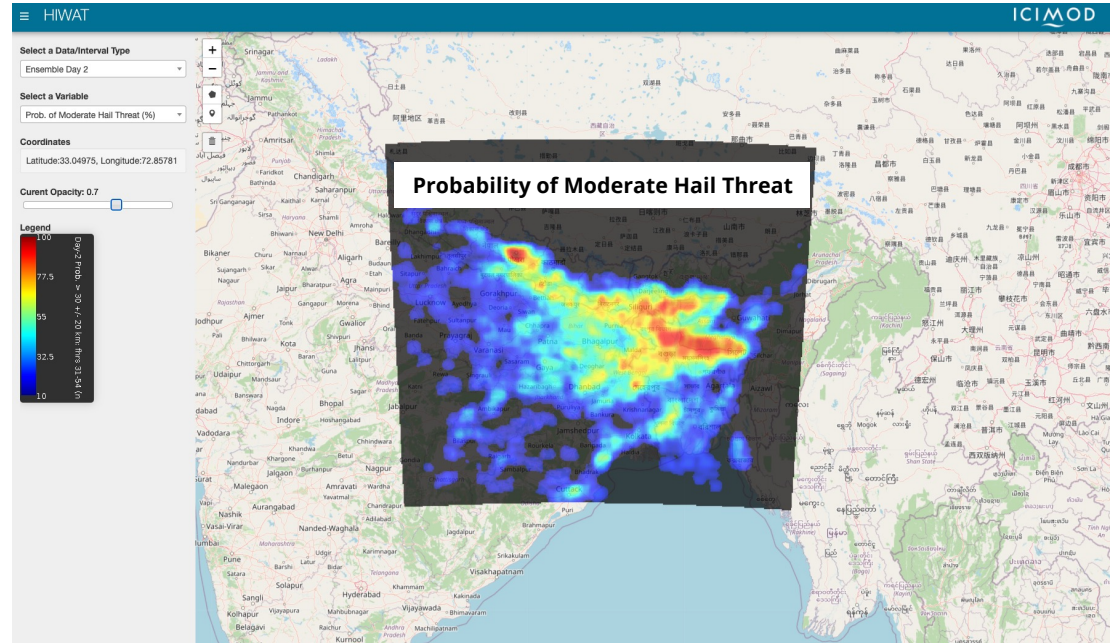
- A limited-area, high-resolution triggered ensemble prediction system for severe weather threat
- This system has been developed for South Asia and its outputs have been further coupled to hydrologic model for flood applications



# Improving Storm Forecasting Across South Asia

***Impact-based forecasting*** is a rapidly emerging area that focuses on incorporating information on impacts and risks to end-users

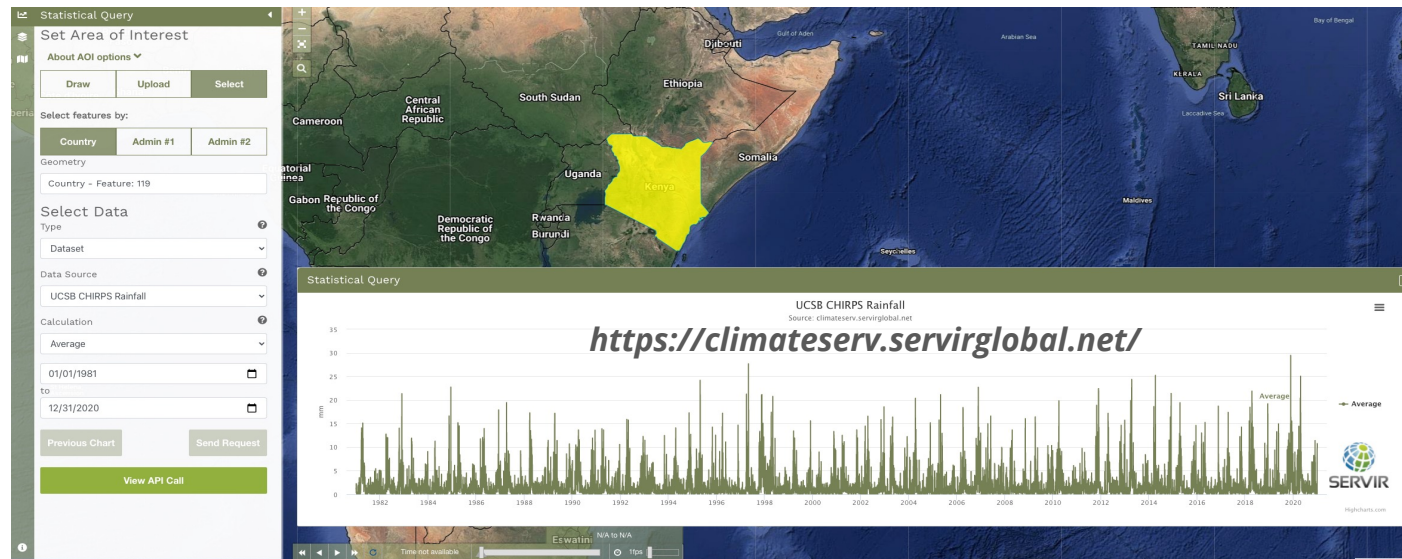
- Information from HIWAT is also disseminated directly to community members, with online visualized forecasts and a separate mobile app from the Bangladesh meteorological department.
- What does a probability of hail mean to a farmer? To an insurance company?*



# ClimateSERV Increases Global Access to Critical Hydroclimatic Data

ClimateSERV provides web-accessible, actionable climate information for regional and local decisionmakers:

- Demand-driven datasets
- Flexible: Download, Visualization, Server-side statistics
- Adaptable: User-specified temporal and spatial querying
- Robust: Low-bandwidth access to data, both GUI and API access



*Example: 40-year query of CHIRPS rainfall for Kenya area-average with less than 30 second return*

- A joint initiative of NASA, USAID, and leading geospatial organizations in Asia, Africa, and Latin America, SERVIR partners with countries and organizations in these regions to address critical challenges in climate change, food security, water and related disasters, land use, and air quality.

## Key Points:

- Demand-Driven: Follow service planning approach
- Co-Development: Focus on working with end-users and developing tools and building capacity to use those tools
- Interdisciplinary: Multiple thematic areas address agriculture and food security, water resources, land cover and land use change, and weather and climate risks